Figure 1: A block diagram of one preferred system architecture
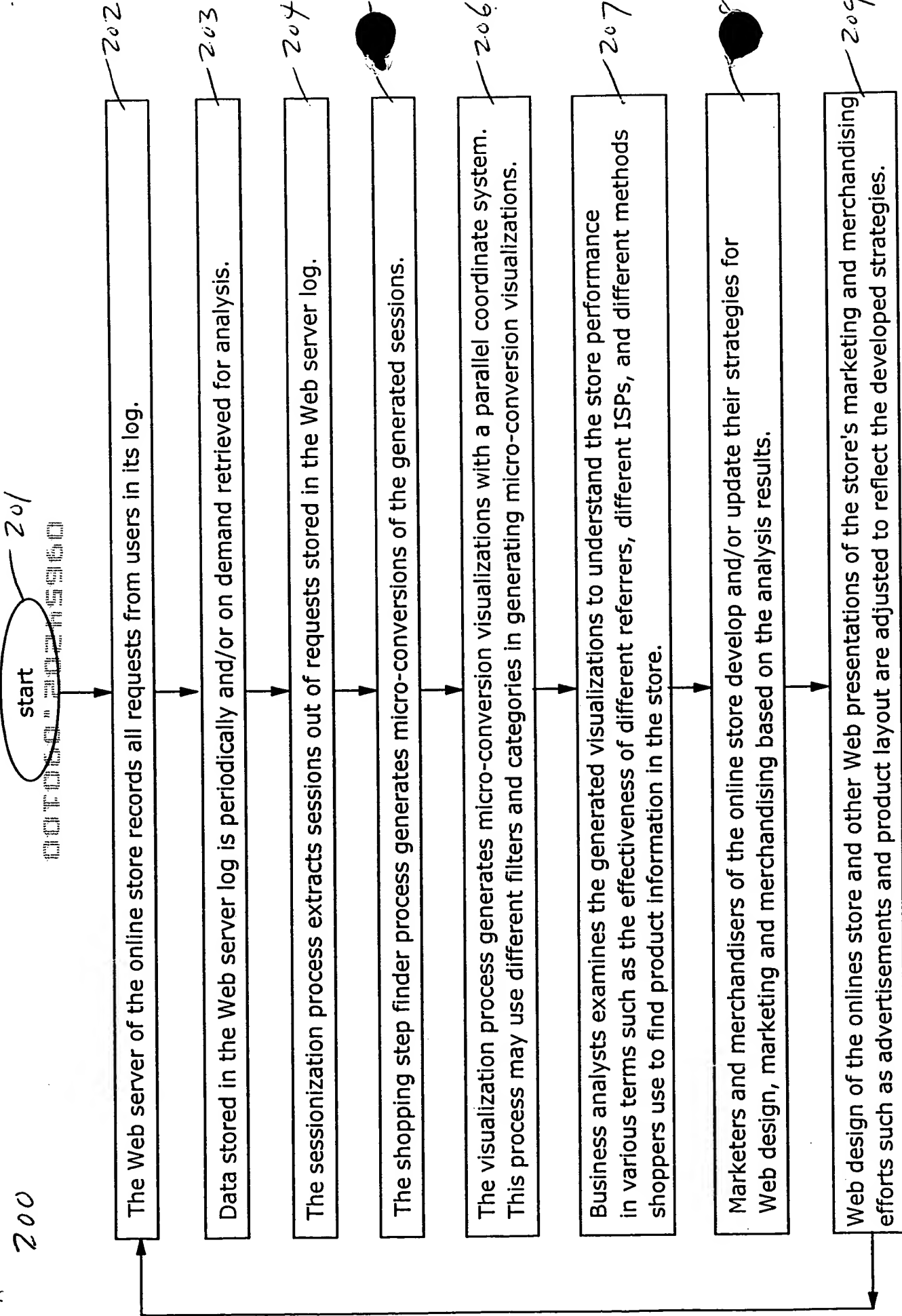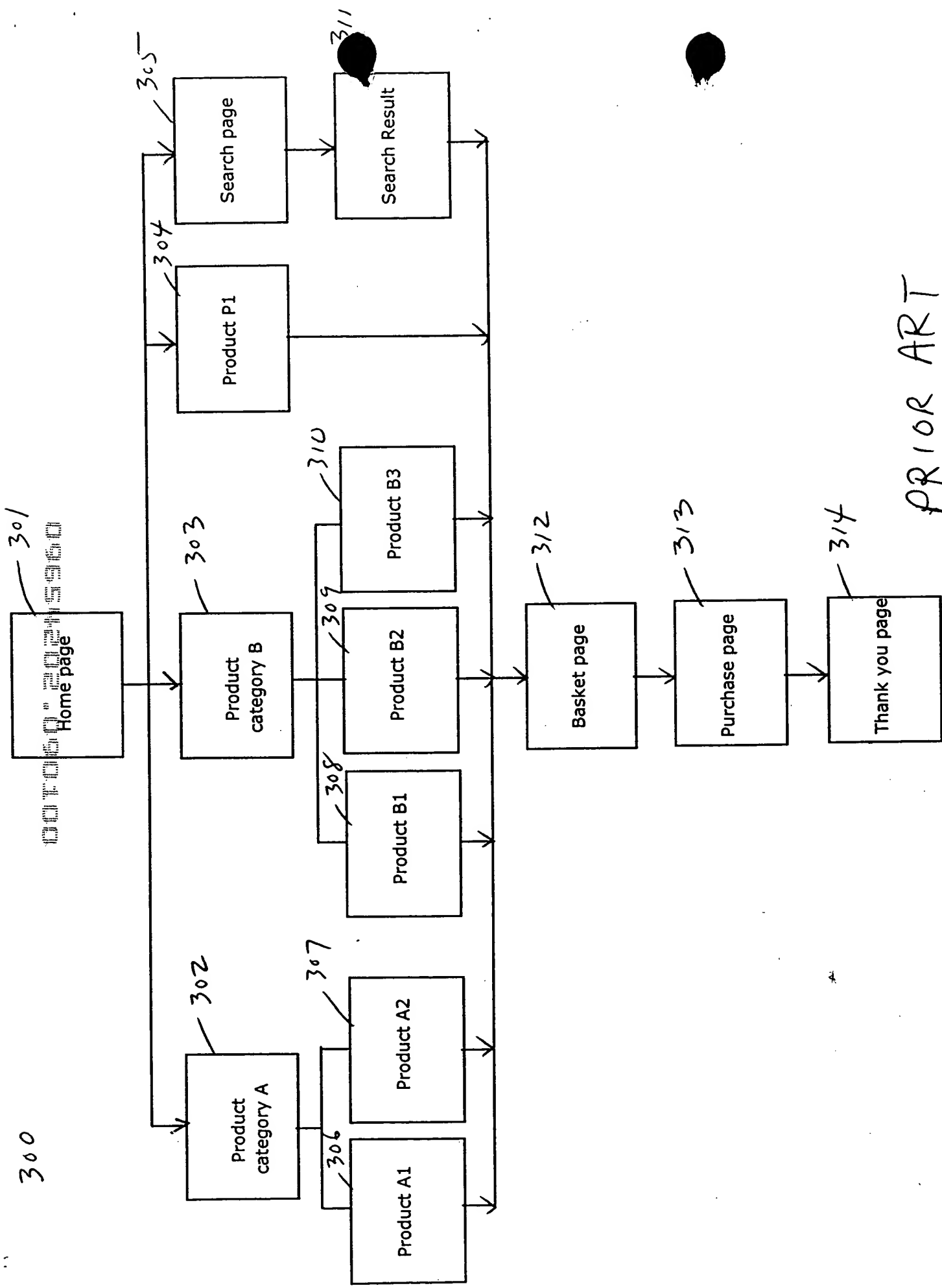
200

201 start

202 The Web server of the online store records all requests from users in its log.

203 Data stored in the Web server log is periodically and/or on demand retrieved for analysis.

204 The sessionization process extracts sessions out of requests stored in the Web server log.

206 The shopping step finder process generates micro-conversions of the generated sessions.

The visualization process generates micro-conversion visualizations with a parallel coordinate system. This process may use different filters and categories in generating micro-conversion visualizations.

207 Business analysts examines the generated visualizations to understand the store performance in various terms such as the effectiveness of different referrers, different ISPs, and different methods shoppers use to find product information in the store.

Marketers and merchandisers of the online store develop and/or update their strategies for Web design, marketing and merchandising based on the analysis results.

205 Web design of the onlines store and other Web presentations of the store's marketing and merchandising efforts such as advertisements and product layout are adjusted to reflect the developed strategies.

Figure 2: A flow chart of a preferred business process

300

301 Home page

302 Product category A
303 Product category B

305 Search page
304 Product P1

311 Search Result

307 Product A2
306 Product A1

310 Product B3
309 Product B2
308 Product B1

312 Basket page

313 Purchase page

314 Thank you page

PRIOR ART

Figure 3: An example of an online store structure

Timestamp	Session ID	Referrer	Current Page	Links
T1	S1	R1	Home	A, B, P1, Search
T2	S2	R2	Home	A, B, P1, Search
T3	S1	Home	A	A1, A2
T4	S3	R3	Home	A, B, P1, Search
T5	S2	Home	Search	
T6	S1	A	A1	Basket, A
T7	S3	Home	P1	Basket
T8	S1	A1	Basket	Purchase, Home
T9	S2	Search	Search Result	A2, B1, B2
T10	S1	Basket	Home	A, B, P1, Search
T11	S2	Search Result	B1	Basket, B
T12	S1	Home	B	B1, B2, B3
T13	S1	B	B2	Basket, B
T14	S1	B2	B	B1, B2, B3
T15	S2	B1	Basket	Purchase, Home
T16	S1	B	B3	Basket, B
T17	S2	Basket	Purchase	Thank You
T18	S3	P1	Home	A, B, P1, Search
T19	S1	B3	Basket	Purchase, Home
T20	S1	Basket	Purchase	Thank You
T21	S1	Purchase	Thank You	Home
T22	S3	Home	A	A1, A2
T23	S2	Purchase	Thank You	Home

Figure 4: An example of a Web server log of an online store

(a) Session S1 — 501

Timestamp	Session ID	Referrer	Current Page	Links
T1	S1	R1	Home	A, B, P1, Search
T3	S1	Home	A	A1, A2
T6	S1	A	A1	Basket, A
T8	S1	A1	Basket	Purchase, Home
T10	S1	Basket	Home	A, B, P1, Search
T12	S1	Home	B	B1, B2, B3
T13	S1	B	B2	Basket, B
T14	S1	B2	B	B1, B2, B3
T16	S1	B	B3	Basket, B
T19	S1	B3	Basket	Purchase, Home
T20	S1	Basket	Purchase	Thank You
T21	S1	Purchase	Thank You	Home

(a) Session S1 — 501

(b) Session S2 — 502

Timestamp	Session ID	Referrer	Current Page	Links
T2	S2	R2	Home	A, B, P1, Search
T5	S2	Home	Search	
T9	S2	Search	Search Result	A2, B1, B2
T11	S2	Search Result	B1	Basket, B
T15	S2	B1	Basket	Purchase, Home
T17	S2	Basket	Purchase	Thank You
T23	S2	Purchase	Thank You	Home

(b) Session S2 — 502

(c) Session S3 — 503

Timestamp	Session ID	Referrer	Current Page	Links
T4	S3	R3	Home	A, B, P1, Search
T7	S3	Home	P1	Basket
T18	S3	P1	Home	A, B, P1, Search
T22	S3	Home	A	A1, A2

(c) Session S3 — 503

Figure 5: An example of sessions in an online store

604   **605**   **606**   **607**

Product impressions	Clickthroughs	Basket placement	Purchase
T1, P1	T6, A1	T8, A1	T20, A1
T3, A1	T13, B2	T19, B3	T20, B3
T3, A2	T16, B3		
T10, P1			
T12, B1			
T12, B2			
T12, B3			
T14, B1			
T14, B2			
T14, B3			

(a) Micro-conversions of session S1 — 601

Product impressions	Clickthroughs	Basket placement	Purchase
T2, P1	T11, B1	T15, B1	T17, B1
T9, A2			
T9, B1			
T9, B2			

(b) Micro-conversions of session S2 — 602

Product impressions	Clickthroughs	Basket placement	Purchase
T4, P1	T7, P1		
T18, P1			
T22, A1			
T22, A2			

(c) Micro-conversions of session S3 — 603

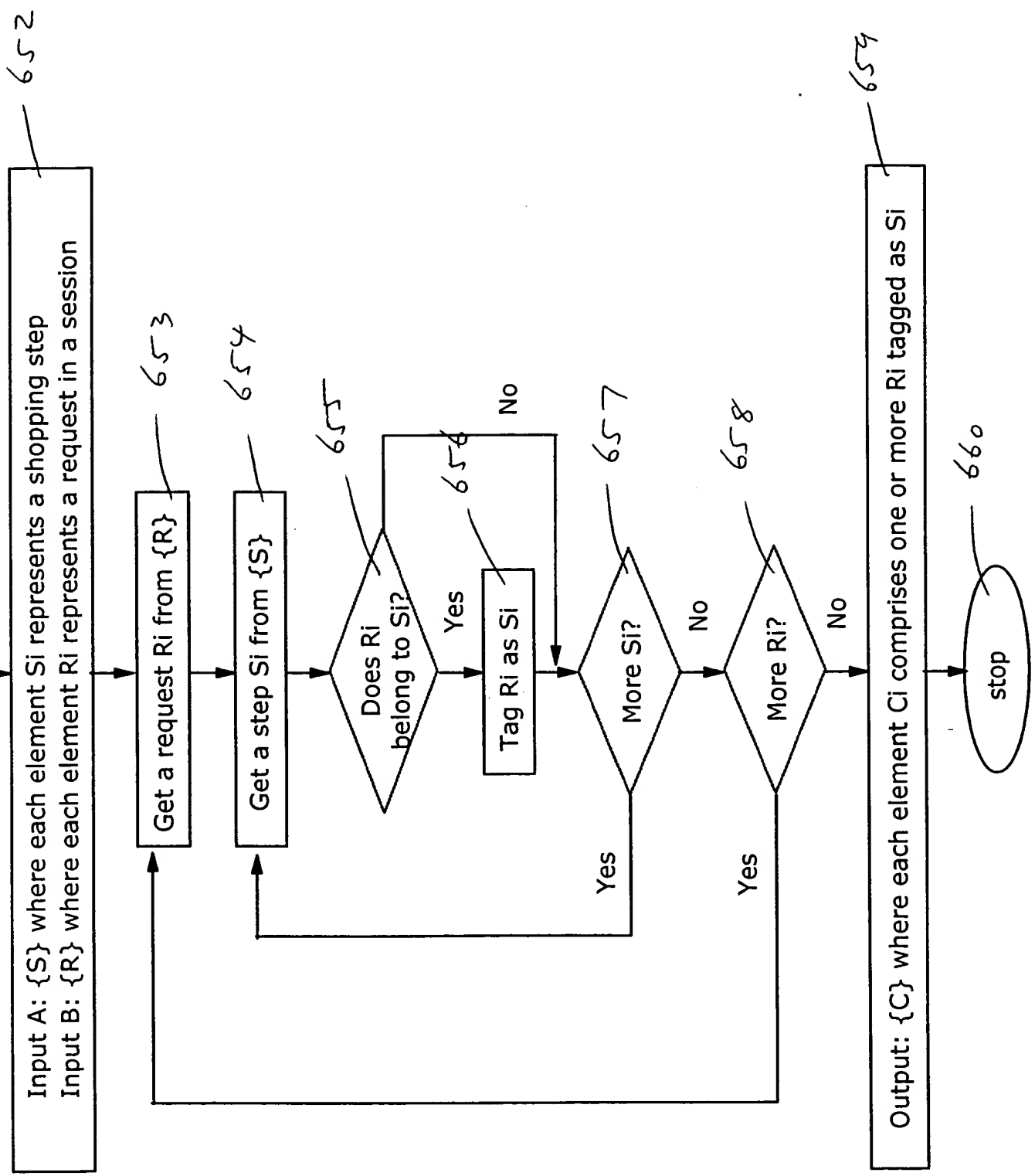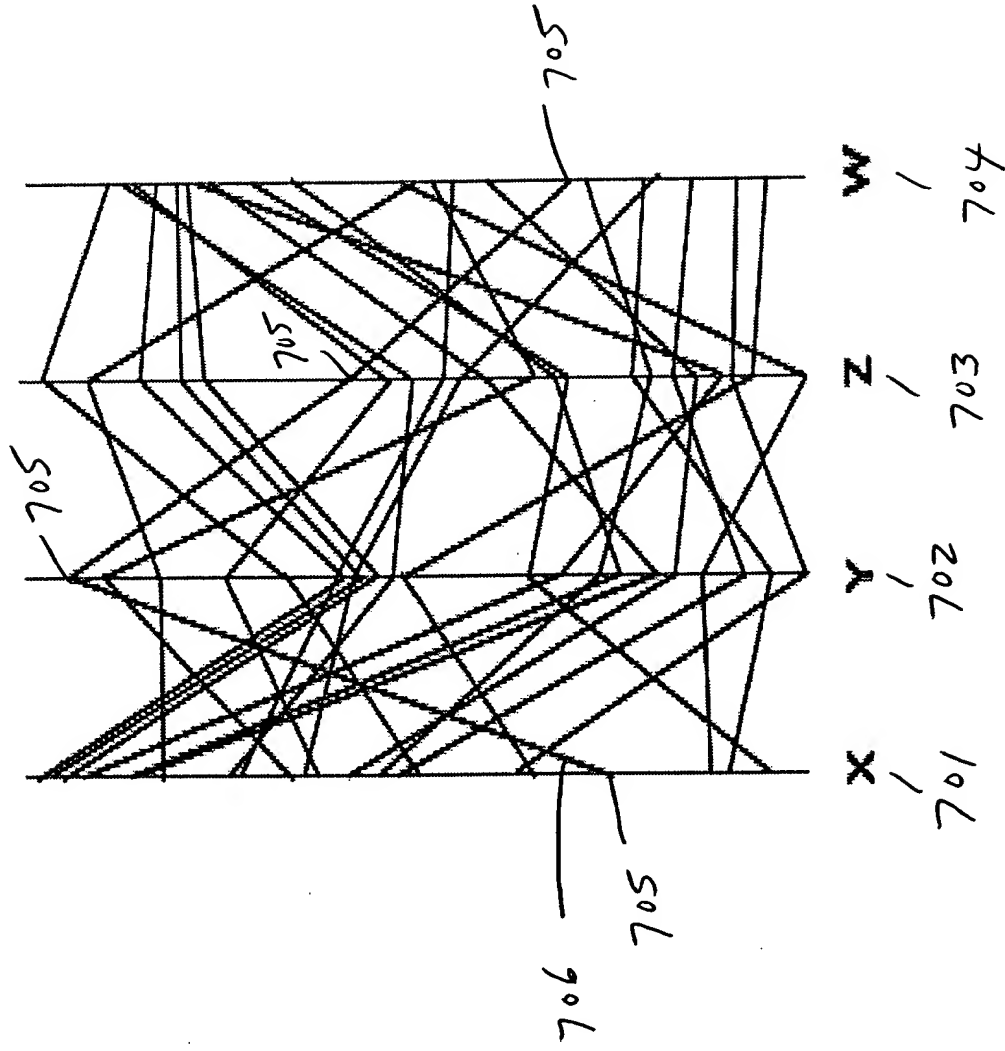**Figure 6: An example of micro-conversions in an online store**

600

651

Input A: {S} where each element Si represents a shopping step
Input B: {R} where each element Ri represents a request in a session

652

(start)

Get a request Ri from {R}   653

Get a step Si from {S}   654

Does Ri belong to Si?   655

Yes → Tag Ri as Si   656

No

More Si?   657

Yes → (back to Get a step Si from {S})

No

More Ri?   658

Yes → (back to Get a request Ri from {R})

No

Output: {C} where each element Ci comprises one or more Ri tagged as Si   659

(stop)   660

Figure 6A: A flow chart of a shopping step finder process

701 X
702 Y
703 Z
704 W

705
705
705
706

Prior Art

Figure 7: An example of a traditional parallel coordinate system

800

801

Referrers

802

Product
Impressions

803

Click-
throughs

804

Basket
Placement

805

Purchase

806

807

808

809

810

811

812

813

814

A

B

Categories
axis

Common
independent
variable, e.g. time
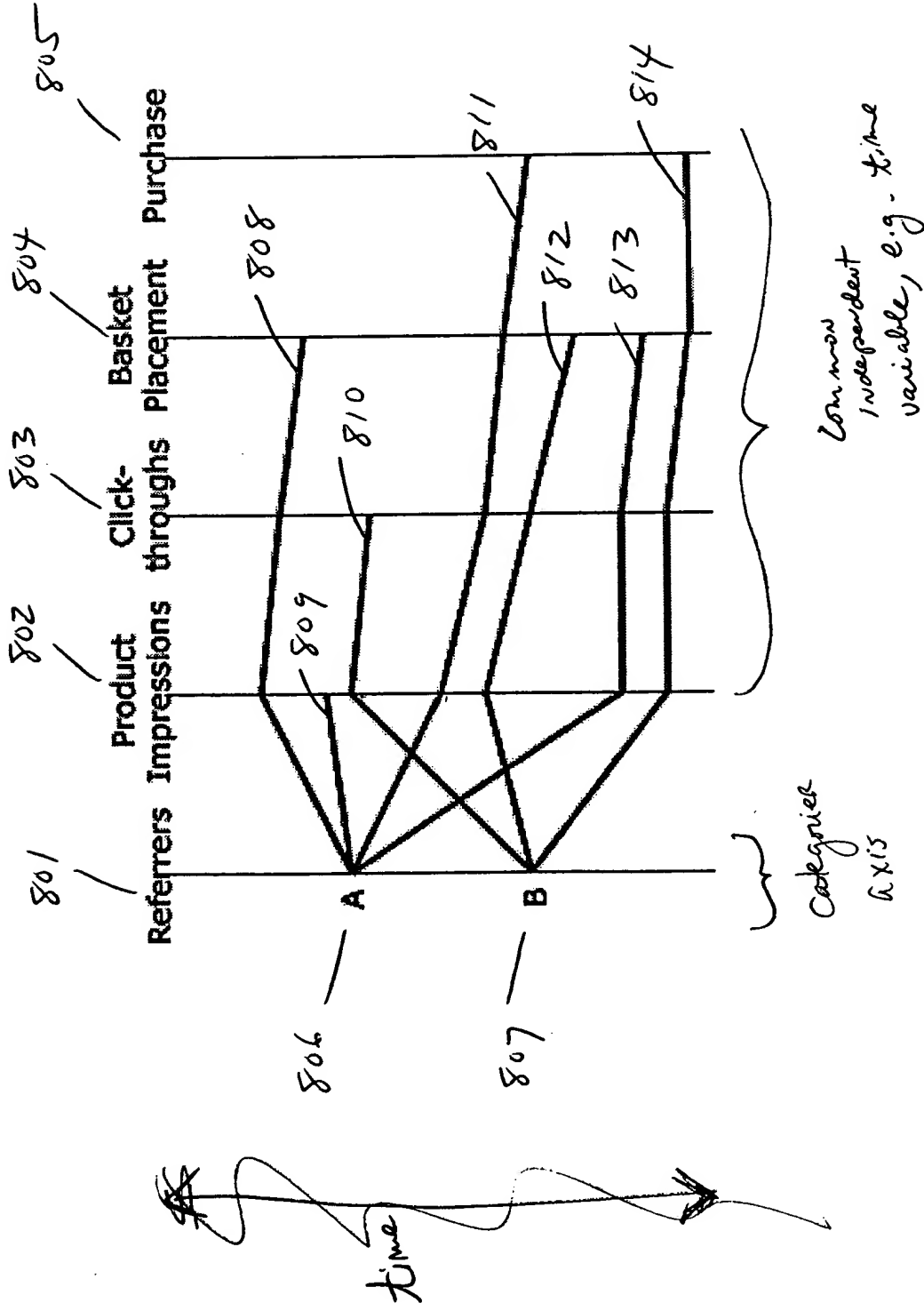
time

Figure 8: An example of a micro-conversion visualization with a parallel coordinate system

900

Referrers
☑ Referrer A
☑ Referrer B
☐ Referrer C

910

Product Category
☑ Men's
☑ Women's
☐ Children's
☐ Housewares

920

901 902 903 904 905

Referrers | Product Impressions | Click-throughs | Basket Placement | Purchase

A

B

906

907
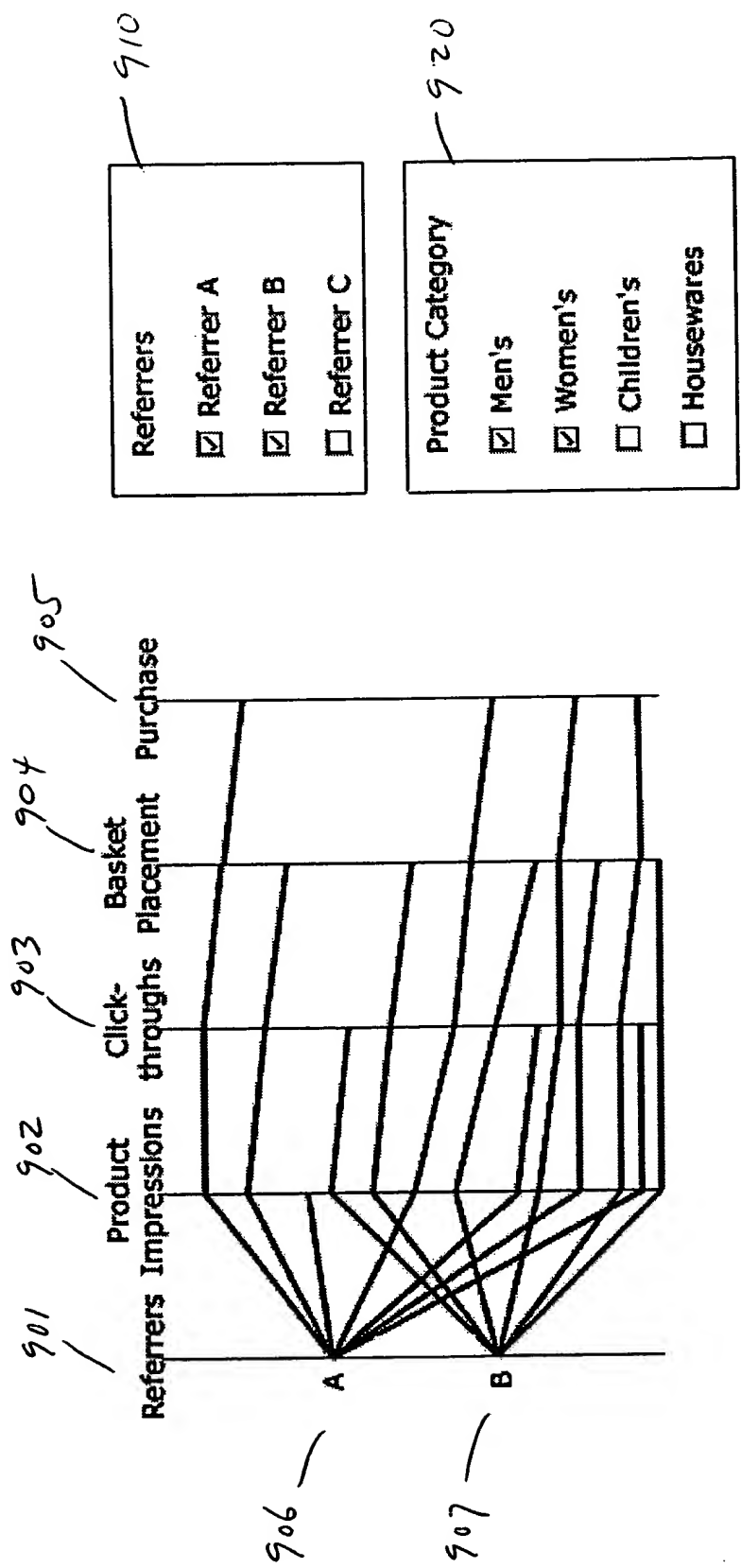
Figure 9: An example of a micro-conversion visualization with filters

Timestamp	Session ID	Store	Referrer	Current Page	Links
T4	S3	ST1	R3	Home	A, B, P1, Search
T7	S3	ST1	Home	P1	Basket
T18	S3	ST1	P1	Home	A, B, P1, Search
T22	S3	ST1	Home	A	A1, A2
T23	S3	ST2	ST1	Home	B, C, D, Search
T24	S3	ST2	Home	Search	
T25	S3	ST2	Search	Search Results	C2, C3, D1
T26	S3	ST2	Search Results	C2	Basket, C
T27	S3	ST2	C2	Search Results	C2, C3, D1
T28	S3	ST2	Search Results	C3	Basket, C
T29	S3	ST3	ST2	Home	A, B, C, D, Search
T30	S3	ST3	Home	Search	
T31	S3	ST3	Search	Search Results	A1, B1, C3, D2
T32	S3	ST3	Search Results	D2	Basket, D
T33	S3	ST3	D2	Basket	Purchase, Home
T34	S3	ST3	Basket	Home	A, B, C, D, Search
T35	S3	ST3	Home	D	D1, D2, D3
T36	S3	ST3	D	D3	Basket, D
T37	S3	ST3	D3	Basket	Purchase, Home
T38	S3	ST3	Basket	Purchase	Thank You
T39	S3	ST3	Purchase	Thank You	Home

1000 1001 1002 1003 1004 1005 1006

Figure 10: An example of a session browsing more than one online stores

1100

1101　1102　1103　1104

Product impressions	Clickthroughs	Basket placement	Purchase
T4, P1, ST1	T7, P1, ST1	T33, D2, ST3	T38, D2, ST3
T18, P1, ST1	T26, C2, ST2	T37, D3, ST3	T38, D3, ST3
T22, A1, ST1	T28, C3, ST2		
T22, A2, ST1	T32, D2, ST3		
T25, C1, ST2	T36, D3, ST3		
T25, C3, ST2			
T25, D1, ST2			
T27, C2, ST2			
T27, C3, ST2			
T27, D1, ST2			
T31, A1, ST3			
T31, B1, ST3			
T31, C3, ST3			
T31, D2, ST3			
T35, D1, ST3			
T35, D2, ST3			
T35, D3, ST3			

Figure 11: An example of micro-conversions of a session browsing more than one online stores
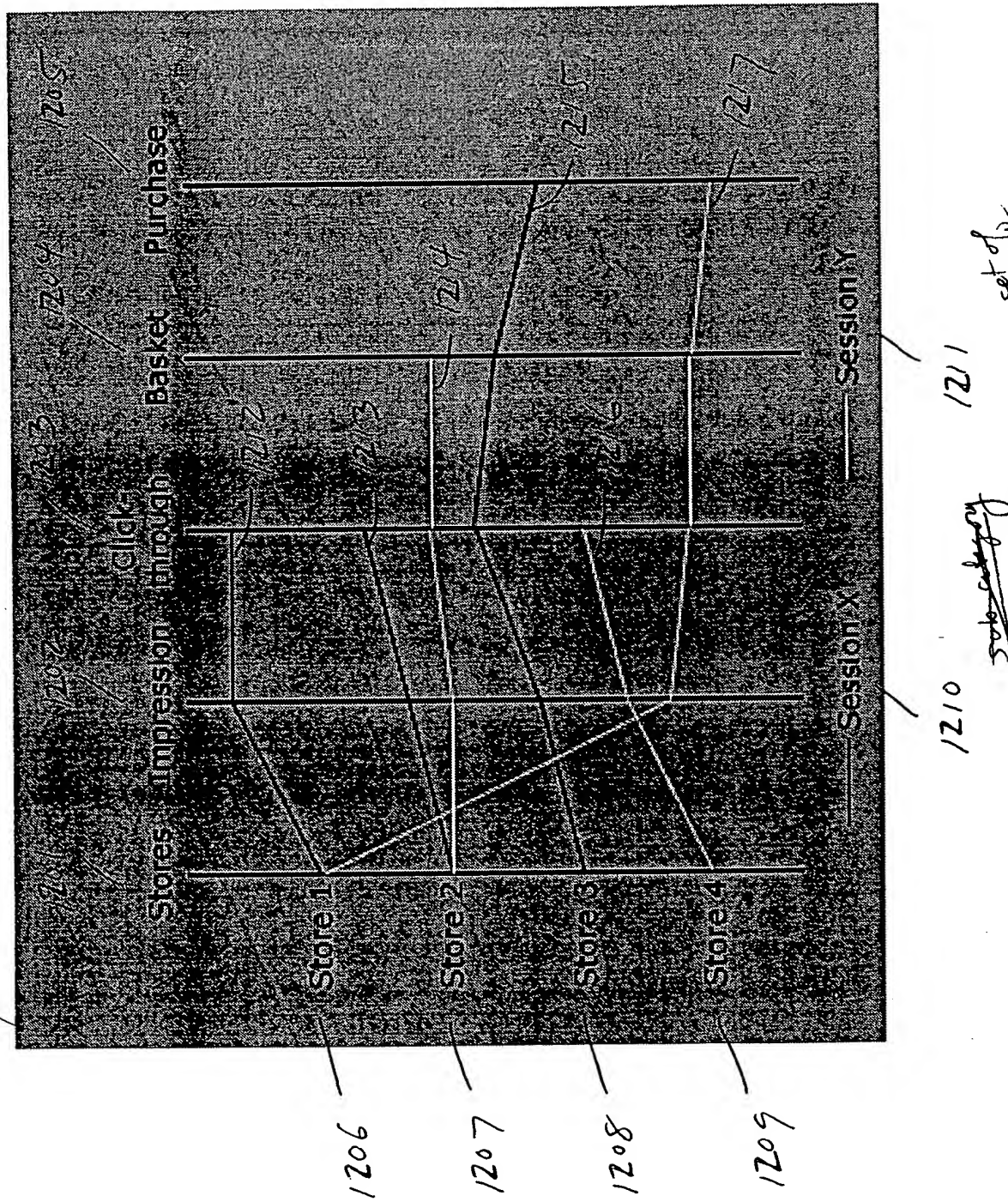
Figure 12: An example of visualizing shopping activities in more than one online stores